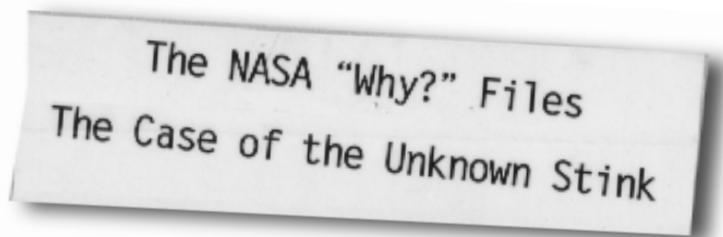


The Case



*In this program, students are invited to actively join the tree house detectives as they investigate the **Case of the Unknown Stink**. The tree house detectives accept the challenge of trying to find the source of an unpleasant odor that is invading the surrounding neighborhoods.*

To determine the source of the stink, our detectives learn about the sense of smell: what it is, how people and animals smell, and how wind speed and direction influence the movement of odor. They also learn how NASA's Atmospheric Science research can help solve the case. While investigating, the tree house detectives learn that the source of the "unknown stink" is "right under their very noses."

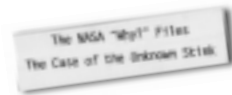
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Part 2	Search for the Stink
Part 3	We're Almost There
Part 4	This is it!

The NASA "Why?" Files
The Case of the Unknown Stink

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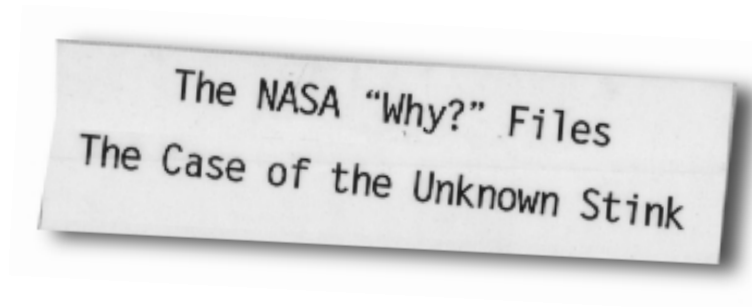
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The Case National Standards



National Science Education Standards	National Educational Technology Standards	National Mathematics Standards	National Geography Standards
The student will develop abilities necessary to do scientific inquiry.	The student will understand and use basic operations and concepts of technology.	The student will apply a variety of techniques, tools, and formulas for determining measurement.	The student will understand how to use maps and other geographical representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
The student will develop an understanding about scientific inquiry.	The student will use technology tools productively.	The student will pose questions and collect, organize, and represent data to answer those questions.	The student will understand how to analyze the spatial organization of people, places, and environments on Earth's surface.
The student will develop an understanding of personal health.	The student will use technology as a communication tool.	The student will interpret data using methods of exploratory data analysis.	
The student will develop an understanding of changes in the Earth and sky.	The student will use technology as a research tool.	The students will organize and consolidate student mathematical thinking to communicate with others.	
The student will develop an understanding about science and technology.	The student will use technology resources in problem solving and decision making.	The student will recognize, use, and learn about mathematics in contexts outside mathematics.	
The student will develop an understanding of changes in the environment.		The student will create and use representations to organize, record, and communicate mathematical ideas.	
The student will develop an understanding of science as a human endeavor.			

Part 1



Part 1 | What's the Stink?

Age Range
Ages 8-10

Duration
15 Minutes

Science Concepts

Science as Inquiry
Science and
Technology
Science in
Personal and Social
Perspectives
History and
Nature of Science

**Mathematics
Concepts**

Measurement
Data Analysis,
Statistics, and
Probability
Connections
Representation

**Key Science
Vocabulary**

Data
Experts
Internet
Scientific Method
Science by Inquiry
Hypothesis
Observation
Scientist
Engineer
Variables

Program Overview

Part 1: What's the Stink?



Three friends (ages 8, 9, and 10) meet after school in a tree house that belongs to one of the children to watch the TV program, NASA's Kids Science News Network (KSNN). The children learn from the program that a nearby town is being bothered by an unpleasant odor, and viewers are invited to assist with solving the problem of the unknown source of the odor. The three friends decide to try to solve the problem. A neighbor, a retired science professor, assists them with suggestions for informational resources and introduces them to the scientific method.

They learn the necessity of identifying the problem, gathering data, forming a hypothesis, testing the hypothesis, controlling the variables, analyzing the data, and reaching a conclusion. To begin their problem solving, the three investigators search for information about smells by using the tree house computer, the Internet, and a web browser. They visit a NASA Langley electronics engineer to learn about conducting experiments and the role variables play in scientific research.

Science as Inquiry
Science and
Technology
Science in
Personal and Social
Perspectives
History and
Nature of Science

Science Concepts

Part 1: What's the Stink?

National Science Teachers Association (NSTA) Standards

Science as Inquiry

Students develop abilities necessary to do/to understand scientific inquiry.

- Observe and ask questions to identify problems.
- Plan and conduct a simple scientific investigation.
- Use tools and equipment to gather data.
- Compare evidence and what is already known.

Science and Technology

Students develop abilities to understand how technological systems work to help solve problems.

- Use technological designs/tools to gather information.

Science in Personal and Social Perspectives

Students understand how the environment affects personal health.

- Be aware that pollution can influence health and the quality of life.

History and Nature of Science

Students understand that science is a human endeavor.

- Recognize that people of all backgrounds engage in various science career activities.

Measurement
Data Analysis,
Statistics, and
Probability
Connections
Representation

Mathematics Concepts

Part 1: What's the Stink?

National Council of Teachers of Mathematics (NCTM) Standards

Measurement

Students understand systems of measurement and apply a variety to techniques, tools, and formulas for determining measurements.

- Produce simple scale drawings.

Data Analysis, Statistics, and Probability

Students pose questions and collect, organize, and represent data to answer those questions.

- Organize data by using tables and graphs.

Connections

Students recognize, use, and learn about mathematics in contexts outside of mathematics.

- Observe the mathematics and science connections in problem solving and experiments.

Representation

Students create and use representations to organize, record, interpret, and communicate mathematical ideas.

- Use graphs to mathematically represent a written image/response to a question or problem.

Key Science Vocabulary

Part 1: What's the Stink?

Data	factual information, especially information organized for analysis or used to make decisions
Experts	persons who are highly skilled or knowledgeable in a certain subject or area
Internet	a worldwide information system in which computers are connected so that computer users can communicate and/or obtain information
Scientific Method	there is no one scientific method, rather methods or science: a set of interrelated processes of posing questions and investigating phenomena
Science by Inquiry	process through which science content is learned where the student is the facilitator of the learning
Hypothesis	an estimate or "educated guess" for solving a problem based on facts, observations, and available data
Observation	the act of systematically observing or paying careful attention to something and noting or recording what was observed
Scientist	a person who has special training and expertise/knowledge in the observation, identification, description, experimental investigation, and explanation of scientific facts or occurrences
Engineer	a person who has special training and practice in applying scientific principles to the practical design, manufacture, and operation of structures and machines
Variables	changes which can be controlled by the experimenter when doing an experiment

Before Viewing
(Questions 1-2)

After Viewing
(Questions 3-9)

Program Discussion

Part 1: What's the Stink?

Before Viewing

1) Ask the students to predict from the title (*What's the Stink?*) what they think the content of the video program will be.

After the students offer their suggestions about the video's content, record 5 or 6 of the ideas and have the class vote on the one they feel may be the most accurate prediction. Help the students graph the voting outcome. (The graphing can be done now or later as a class or independent extension activity.)

2) Encourage the students to brainstorm the processes of the scientific method. List the suggested processes on the chalkboard or chart. Tell the students that a comparison will be made after they view the video to see if all the processes have been included or if revisions are needed.

Accept whatever the students suggest prior to viewing the program. After they view the program, give the students an opportunity to revise the list according to the information learned. The revised list should include identifying the problem, asking questions about the problem, observing and gathering data or helpful information, forming a hypothesis, testing the hypothesis, trying again if the data does not support the hypothesis, reaching a reasonable conclusion or explanation, and communicating the results. (Initially, third graders may be able to comply only by naming a specific question to be answered, finding out information about the question, answering the question based on the findings, and presenting the results to others.

After Viewing

3) Ask the students why Phewsville is an appropriate name for the town with the bad odor.

“Phew” is an expressive sound often used to describe something unpleasant, such as an offensive odor.

4) Have the students identify the problem the tree house detectives will be trying to solve. Have the students explain why this problem needs to be solved.

The problem is, “What is the odor or stink and what is causing it?” The problem needs to be solved because the odor is unpleasant for the residents of Phewsville, it causes air pollution, and it may have an adverse or negative effect on people with certain health conditions such as asthma and other respiratory illnesses.

5) Ask the students to name the resources and the steps taken by the video investigators thus far in trying to solve the problem of the odor/stink.

The tree house detectives have identified the problem, begun an informational chart, used the Internet, asked their neighbor for help, and visited an expert (NASA electronics engineer).

6) Ask the students to name the three basic informational resources suggested by Dr. D. Question the students as to why Dr. D cautioned the children to “look at everything you read with a critical eye.”

The basic resources suggested by Dr. D are books, the Internet (computer), and experts.

Anyone can write something for publication or on the Internet without the information being accurate or carefully researched. Therefore, it is best to check several sources to be sure that the information is correct.

7) Work with the students to create, on the chalkboard or on a chart, Need to Know Board similar to the one the tree house detectives prepared to help them with the problem. (*You may prefer to give the students the headings and then have them complete the chart as a summary activity.*)

Need to Know Board

What we know	What we need to know	Where to go for help
Health Department has given a warning	What’s in a smell	Dr. D (science expert)
People in Phewsville smelled something bad	How a smell moves	Computer/Internet
No one knows where the smell is coming from	How to experiment	NASA electronics engineer

8) Refer to any recent class experiment; have the students define the term variable and name the variables in that experiment. (*Answers will vary.*)

9) Explain that the title of the next video in the series is *The Search for the Stink*. Encourage the students to predict what they think the three friends will do next in trying to solve the problem.

Accept all suggestions; however, to promote the students’ logical thinking and problem-solving skills, ask the students to explain why the suggested steps would be helpful.

NOTE:
The extensions can be class or individual enrichment activities and should be selected and/or adapted according to student developmental levels.

Program Extensions

Part 1: What's the Stink?

1. Language Arts

Students suggest what they think would be a good name for the tree house and write a paragraph to explain why they selected that name.

2. Mathematics and Language Arts

Students draw a design, similar to a simple blueprint, for a tree house. Ask them to draw the design to scale and label the dimensions. Have them list or write in narrative form how they would furnish a tree house and what things they would include if they built a tree house (See "My Tree House" page 22.)

3. Science and Language Arts

Direct the students to copy the informational chart (prepared as a class or summary activity) in their science notes so they can refer to and add data as they work with the subsequent tapes in the series.

4. Science, Technology, and Language Arts

Students explain (orally or in writing) the experiment that is being conducted by NASA concerning safer landings on airport runways during inclement weather and tell why this experiment is important to air travelers and air transportation. Include a description of how NASA uses computers in the experiment and ask them to identify the four variables in the experiment.

5. Science and Language Arts

Encourage interested students to design and share their own experiments showing how an object moves on both a dry and a wet surface. Have them state their conclusions.

6. Science and Language Arts

Students make a list of their favorite smells and a list

of their least favorite smells. Compare lists with partners or in small groups. Additionally, have them choose a favorite and a least favorite smell from their lists and write why they made the particular selections (*See "What's That Smell?" page 23.*)

7. Science, Technology, and Language Arts

Students search the topic "smells" on the Internet as the "tree house detectives" did to see what other interesting facts can be found. Let the students share some of their findings with the class orally or in writing.

8. Science, Technology, and Language Arts

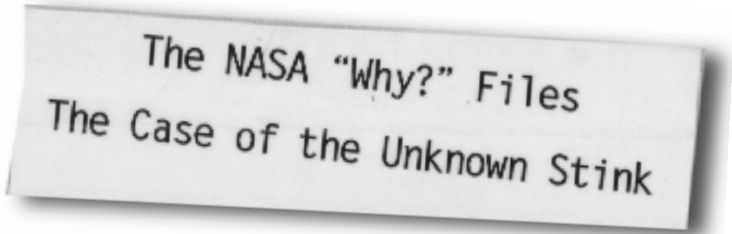
Students use the Internet or available print materials to learn more about snakes' and sharks' sense of smell. Write and/or report orally the findings to the class.

Options for further research topics: air pollution; respiratory diseases; the NASA Boeing 757 airplane; and an environmental, aeronautics, or computer scientist or invention.

9. Science and Technology

Encourage the use of the NASA "Why?" Files web site.
<http://whyfiles.larc.nasa.gov>

Exercises



The NASA "Why?" Files
The Case of the Unknown Stink

Part 1 : What's the Stink?

Need to Know Board

Need to Know Board	WHAT WE KNOW	WHAT WE NEED TO KNOW	WHERE TO GO FOR HELP

The MDA "day" files.
The Case of the Unknown Stink

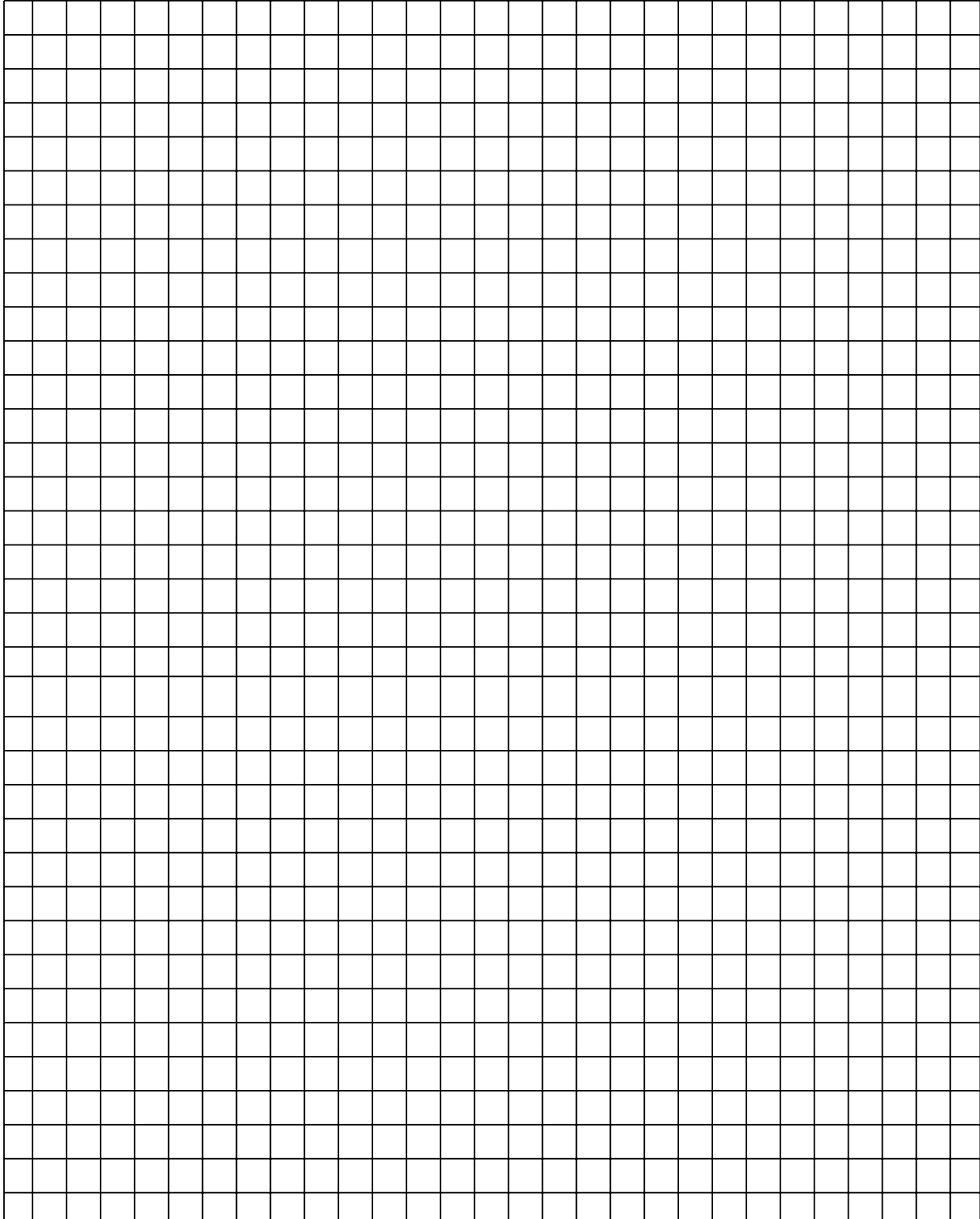
My Tree House

Design a blueprint of your tree house. Use the graph below and determine an appropriate scale.

The Case of the Unknown Stink

Part 1: What's the Stink?
Exercise 2

Key: 1 square unit = _____



Problem

What is that smell?

Materials

1. 10 black plastic film canisters with lids that have 4-5 holes punched in the top of each
2. 10 cotton balls
3. 5 different scents (suggestions: vanilla, peppermint, perfume scents, and cooking scents)
4. Permanent marker
5. Blindfold
6. Scent Control Chart (this page)
7. Student Data Chart (page 25)

Procedure

1. Place a few drops of a scent on two cotton balls.
2. Place each cotton ball in a film canister and replace the lid.
3. Using the permanent marker on the top of both lids, label them both canister "A." The other canisters will be labeled in pairs as "B," "C," "D," and "E."
4. Write the scent in the control chart.
5. Repeat Steps 1-4 with the other four canisters, putting a different scent for each pair.
6. Now you are ready to test your partners.
7. Have all partners waft the smell in canister A toward their noses. To waft, hold the container a short distance from your nose and using your other hand, wave the smell towards yourself. You never want to directly smell an unknown substance.
8. Partners will then try to guess the smell.
9. They will write their guesses on the data sheets.
10. Compare the correct answers to each partner's responses.
11. Blindfold your partners.
12. Choose one of the scents and let each partner waft it towards himself/herself.
13. Let partners smell the other scents until they find the matching scent.
14. Repeat until all scents are matched.
15. Take the blindfold off and let your partners see if they were correct!
16. Now it is your turn. Repeat the second part of the experiment, steps 11-15.

Data

Scent Control Chart

Canister A	Canister B	Canister C	Canister D	Canister E

Student Data Chart

Write your guess for each canister in the appropriate blank.

Canister A	Canister B	Canister C	Canister D	Canister E

Conclusion

1. Which smell was the easiest to match?
2. Which smell was the most difficult to match?
3. Why do you think some smells were easy and some were more difficult?
4. How was your sense of smell affected while blindfolded?

